



# Chambers's Journal

## SIXTH SERIES.

### SOME FORECASTS OF SCIENCE.



AN article recently appeared in the *Century Magazine* which is sure to attract the attention of all thoughtful men. It is from the pen of the great Slavonic-American electrician, Nikola Tesla, and its title is 'The Problem of Increasing Human Energy, with special reference to the Harnessing of the Sun's Energy.' In many respects this remarkable paper may be regarded as a sermon, and a very good sermon, from a lay preacher of unusually high attainments. He takes for his text the well-known line, *Mens sana in corpore sano*, and strives to show how wrong-doing of every kind is like a canker at the heart of mankind, keeping a constant check on human progress. He deplores the awful waste of life due to war, to famine, and to disease, and shows how these evils must reduce the sum of human energy. Despite its rather ponderous title, the article is one which will appeal to nearly all classes of readers, for it deals with a variety of interests; and it is in the hope that we may increase the number of those who will give it appreciative attention that we now devote a few remarks to its more salient features.

M. Tesla regards this busy world as an immense clockwork driven by a spring, the energy for actuating which emanates from one single source—the sun. The problem, therefore, of increasing human energy will be solved if man can learn to utilise more of the sun's energy; and he proceeds to examine the various means by which this will probably be achieved in the future. At the same time, he details the causes which tend to diminish human energy, and in so doing is led into many bypaths which afford him opportunity for interesting comment. Thus, speaking of the evils wrought by intemperance, he groups together whisky, wine, tea, coffee, and tobacco as being responsible for shortening the lives of many, and pleads for moderation in their use, not abstinence. He believes that the good people who are so energetic in forcing their

total abstinence views upon their fellow-mortals could make themselves far more useful by turning their efforts towards providing pure water, because 'for every person who perishes from the effect of a stimulant, at least a thousand die from the consequences of drinking impure water.' Little is being done to eliminate the germs of disease from public water-supplies, and no satisfactory method of sterilising great quantities of water has yet been adopted. M. Tesla believes that electrically produced ozone will in future solve this important problem.

About the terrible evil of organised warfare M. Tesla has also much to say, but he does not give much hope of the early coming of that day when men shall 'beat their swords into ploughshares.' Some have contended that the advent of the flying-machine must bring about a universal peace; but this he believes to be an erroneous view. 'The flying-machine is coming, and very soon; but the conditions will remain the same as before. In fact, I see no reason why a ruling power, like Great Britain, might not govern the air as well as the sea. Without wishing to put myself on record as a prophet, I do not hesitate to say that the next two years will see the establishment of an "air-power," and its centre may not be far from New York; but, for all that, men will fight on merrily.' Our author then proceeds to trace the evolution of the weapons of war, from the sling and stone, the bow and arrow, to the modern arm of precision. 'What,' he asks, 'is the next phase in this evolution?' He believes that the killing apparatus of the future will be one of specifically great power, but requiring only a few individuals to operate it. The loss of life will become smaller and smaller until eventually 'mere machines will meet in a contest without bloodshed, the nations being simply interested, ambitious spectators.'

The author's remarks respecting the possibility of increasing the world's food-supply are also of the greatest interest. One of the most important

constituents of the soil is nitric acid; and for many years agricultural chemists have been looking for some means by which the ordinarily inert nitrogen of the atmosphere might be assimilated as a plant-food. In the case of certain leguminous crops, the problem is solved by the action of bacteria; but M. Tesla holds out a promise that the change can be brought about by electricity. He plainly states that it is 'practicable to oxidise the atmospheric nitrogen in unlimited quantities, merely by the use of cheap mechanical power and simple electrical apparatus. In this manner many compounds of nitrogen may be manufactured all over the world, at a small cost, and in any desired amount; and, by means of these compounds, the soil can be fertilised and its productiveness indefinitely increased. . . . Soon, I hope, the world will see the beginning of an industry which, in time to come, will, I believe, be in importance next to iron.'

The prolific inventor has another grand scheme in his brain with regard to iron manufacture, a metal which he describes as being 'by far the most important factor in modern progress.' He speaks of the appalling waste of fuel—that is, energy—with which the manufacture of iron is at present carried on, and suggests its economical production by a new process. Dynamos are to be set in motion by the energy of a waterfall, and the current thus produced is, as a preliminary step, employed for decomposing water into its constituent gases—hydrogen and oxygen. The hydrogen would form fuel for smelting the iron ore, and the oxygen would be reserved for other industrial purposes; or it could be employed to burn all kinds of refuse, cheap hydrocarbon, or coal of inferior quality; the heat thus obtained being also used for smelting the metal. Heat-saving devices would be employed; and with the improvements thus foreshadowed, Tesla calculates that 'probably forty thousand pounds of iron could be produced per horse-power per annum by this method.'

With regard to the metal itself, the advances made in its manufacture have of late years been so great that we have arrived virtually at the limit of improvement. M. Tesla believes that, in the near future, iron will, in many of its now uncontested domains, give place to aluminium. This comparatively new metal—it was discovered only seventy years ago—has quickly come down from the price of gold to that of copper, and our author believes that, by a new method of manufacture which he foreshadows, it will become very much cheaper. A further reduction in the price of aluminium will annihilate the copper industry, and after that aluminium will begin to compete seriously with iron. At present iron holds its own in the construction of electrical apparatus because of its magnetism, in which respect it is unique among the metals; and unless a radical change is made in the method by which electric

currents are produced, iron will be indispensable. But M. Tesla has already produced 'electric transformers in which no iron is employed, and which are capable of performing ten times as much work per pound of weight as those of iron.' He owns that many seemingly insuperable difficulties—which, however, will probably be overcome in the end—are still in the way of the universal employment of aluminium for electrical purposes. In the meantime, aluminium will take the place of iron in many other industries—such as shipbuilding, or wherever lightness of construction is required. He believes it will revolutionise naval construction, and do much to hasten the coming of the flying-machine.

A great many suggestions in this interesting paper are certainly chimerical; and we fancy that M. Tesla would be inclined to admit that this is the case. Indeed, in many instances he raises a hope of a certain difficulty being overcome, or a new source of energy utilised, only to show in a succeeding paragraph how impracticable the thing is. Thus, after pointing out the limitations of wind-power, he asserts that 'a far better way, however, to obtain power would be to avail ourselves of the sun's rays, which beat the earth incessantly, and supply energy at a maximum rate of over four million horse-power per square mile;' but he presently admits that study of the matter convinced him 'that the solar engine, a few instances excepted, could not be industrially exploited with success.' Again, with regard to electricity produced by natural causes, he points out that 'lightning discharges involve great amounts of electrical energy, which we could utilise by transforming and storing it;' but he immediately afterwards acknowledges that 'the storing of the energy of lightning discharges will be difficult to accomplish.'

It is interesting to note that M. Tesla puts little faith in the bold anticipations which have been raised in America as to the future of liquid air. 'Much was expected of it in the beginning; but so far it has been an industrial *ignis fatuus*.' He is perfecting apparatus by which its cost will be greatly reduced; but he has evidently little faith in its adaptability for commercial needs. Used as a refrigerant, it is uneconomical, for its temperature is needlessly low; this same lowness of temperature condemns it to a small efficiency as an explosive; and for motive-power purposes its cost is far too high, even were its production as simple as the generation of steam.

Experiments with currents of high frequency have led M. Tesla to devise an ideal system of illumination by means of vacuum tubes, dispensing with incandescent lamps and films, and possibly with the use of wires. 'In this direction,' he says, 'I have met with gratifying success of late; and the practical introduction of this new system of illumination is not far off.' Here we have the definite promise of a boon which comes from a

domain of electrical science which M. Tesla has made his own. He is the first authority on the subject.

Far more startling results, however, than the lighting of lamps without communicating wires are anticipated by M. Tesla from the use of his high-frequency electrical currents. He has conceived the idea of constructing an automaton which shall act like an intelligent being. This wonderful invention was evolved from his active brain; 'and so,' he tells us, 'a new art came into existence, for which the name "telautomatics" has been suggested;' and by way of illustration he publishes a photograph of his first practical 'tel-automaton.' It is in the shape of a boat, with propeller and rudder, and contains its own motive-power; but it is controlled, without wires, 'by transmitting from a distance electrical oscillations to a circuit carried by the boat, and adjusted to respond only to these oscillations.' Such an automaton may be said to borrow its mind from the distant operator, who directs it what to do; but the inventor is not satisfied with this. He has projected another automaton, 'which will have its "own mind";' and by this I mean that it will be able—independent of any operator, and left entirely to itself—to perform, in response to external influences affecting its sensitive organs, a great variety of acts and operations as if it had intelligence. It will be able to follow a course laid out, or to obey orders given far in advance; it will be capable of distinguishing between what it ought and what it ought not to do, and of making experiences—or, otherwise stated, of recording impressions—which will definitely affect its subsequent actions. In fact, I have already conceived such a plan.

We have carefully quoted M. Tesla's own words in connection with this startling announcement, which, if it be realised, will revolutionise industry. If the manufacturer can obtain such automata to do his bidding, to obey him implicitly, and to act conscientiously, as the description seems to imply, he will certainly prefer such servants to those of flesh and blood. The much-worried mistresses of many households will also look forward to the commercial introduction of M. Tesla's automatic 'slavey.'

Not only does M. Tesla arouse our surprise at his prognostications, but he almost takes our breath away by their magnificent daring. He speaks of the development of a new principle, the production of powerful electrical oscillations, efficient apparatus for the production of which he recognised as the key to the solution of other most important electrical and, in fact, human problems. He succeeded in evolving a transformer or induction-coil on new principles, which he calls the electrical oscillator, and photographs showing the stupendous experimental effects obtained by this apparatus illustrate his words. These weird manifestations of electrical force, measuring, we are told, from

sixty to seventy feet across, give one the impression that M. Tesla has harnessed the lightning and can make it do his bidding; but he tells us that these extraordinary results are trifling compared with those attainable by apparatus designed on the same principle. 'I have produced electrical movements occurring at the rate of approximately one hundred thousand horse-power; but rates of one, five, or ten million horse-power are easily practicable. In these experiments effects were developed incomparably greater than any ever produced by human agencies, and yet these results are but an embryo of what is to be.' By help of these developments we shall be able to produce at will an electrical effect upon any portion of the globe, to determine the relative position and course of a distant ship at sea; and, in a time not very distant, submarine cables will become obsolete. More than this, the electrical movements produced and capable of direction will be of such magnitude that they will be perceptible on some of our nearer neighbours in space, as Venus and Mars. 'That we can send a message to a planet is certain; that we can get an answer is probable. Man is not the only being in the Infinite gifted with a mind.'

Now we approach the conclusion of this extraordinary forecast of the possibilities in store for future generations of men. In the course of his investigations M. Tesla has noted that the air, instead of acting as a non-conductor, as it does to ordinary electric currents, gives to these impulses of excessive electromotive force a perfect conducting path better even than copper wire. The energy of thousands of horse-power can be transmitted in this way for thousands of miles, and the system will be both economical and safe. When these anticipations are realised, the countries which are fortunate enough to be rich in waterfalls will find that the export of power will be their chief source of revenue. The United States, Canada, Central and South America, Switzerland, and Sweden will quickly grow rich, and men in all parts of the world will be able to irrigate the soil without difficulty. There will be no more famines in India or elsewhere, and 'the desert shall rejoice and blossom as the rose.'

It is anticipated by M. Tesla that many will consider these results still far from practical application, although they appear to him simple and obvious; and he does not expect that his advanced ideas will be readily taken up. In this respect we think that the author is mistaken in his forecast, for there are now in every country many earnest men who are devoting their lives to the study of electricity; and we may be sure that M. Tesla will secure among them many disciples who will do their best to test his theories. To such men it will be left to decide whether the promise of so many good things has a sound scientific basis, or is only of 'such stuff as dreams are made.'

## OUR LADY OF DELIVERANCE.

CHAPTER XIII.—WHAT VAUREL SAW.

**T**HE murder of Captain Zuyler, and the thought of the madman still at large, had a depressing influence on us all, and the people of the village would not stir out of doors after nightfall upon any consideration whatever. I wished much that mademoiselle could be got away, for the events of the last few days began to tell on her; and yet her society was so very sweet to me that I was loath to suggest any change which must inevitably remove her from such protection as I could offer. But my ideas were suddenly crystallised into action.

I was loitering solitarily on the terrace, on the afternoon of the day on which Colonel Lepard left, when Vaurel came along with the rods and intimated that it was a good day for fishing.

I saw by his face that he had something to say to me, and we set off up the river, past his house, in the direction of Bency; for Juliot and a party of gendarmes from Rennes were ransacking the woods in the other direction in vain search for Roussel.

Vaurel spoke little till we came to his own house. Boulot was inside; but he knew his master's step, and only snuffled at us under the door; and when Vaurel pulled the key out of his pocket and opened it he reared himself up against me and gave me hearty welcome.

I stopped in surprise at seeing my old bed occupied, and was more surprised still when I saw that it was Roussel who was lying there, worn and wasted, and whether dead or asleep I could not tell.

I looked at Vaurel and asked, 'What is the meaning of this?'

Vaurel explained that he found Roussel like that in the wood the morning after the storm, and carried him there. 'It was Colonel Lepard who killed Captain Zuyler; not Roussel at all. I saw it all,' said Vaurel, 'and it seems to me, monsieur, that if we work this matter right we may find the key to unlock Monsieur Gaston's prison and set him free, and restore him whole to mademoiselle, unless he dies in the meantime.'

'Tell me all you know, Vaurel.'

'I had been searching for days past for him, as you know'—nodding towards the bed. 'It seemed to me likely that he used the old mill as a retreat; and so that he should not see me I climbed a tree from which I could keep watch on the mill. That afternoon of the storm Colonel Lepard and the Captain came along the path. The rain was just coming on, and they stopped for shelter under the tree I was on. There was hot dispute going on between them, and this is what they said, as nearly as I can remember it:

The Captain broke out, 'I tell you I will wait no longer. I have waited, waited, waited till my credit is broken. I must have money, and at once.' And the Colonel replied sulkily, 'Well, I haven't got any.' 'Then,' said the other, 'I have made up my mind to sell my wares elsewhere.' 'What do you mean by that?' asked the Colonel angrily. 'Just exactly what I say, my friend,' said the Captain. 'There is a market to my hand here, and the payment will be liberal.' 'You mean mademoiselle?' asked the Colonel. 'Of course,' said the Captain; 'whom else should I mean? Mademoiselle would give half her fortune to learn some things I could tell her.' 'Zuyler, you are a dirty scoundrel!' exclaimed the Colonel. 'There is not much to choose between us, my Colonel,' said the Captain.

'Then the thunder came on, and the lightning began to play among the trees, and I was not very happy. Those below didn't like it either; and Colonel Lepard ran through the rain to the old mill, and the other followed. When the storm cleared for a bit I saw them looking out of the doorway, and then of a sudden the Captain went down like a struck ox, and it was Colonel Lepard who struck him from behind with an iron bar, and struck him again and again as he lay on the ground. The Colonel stood looking at him for a time; then he threw down his *képi*, swung the bar between his legs, and brought it down on his own bare head, swearing horribly at the pain he gave himself. He afterwards dabbed some of the other's blood over his own head and face, and started off for home. It all paralysed me; and when I came down at last and went to see if any life was left in the Captain, Juliot came along from Bessancy way and found me, and thought I'd done it. Perhaps he had reason. But it all happened just as I have told you, monsieur.'

'It's a terrible story, Vaurel.'

'And every word of it is true, monsieur. And now,' he said, 'we have Colonel Lepard in the hollow of our hands, and if we can't wring the truth out of him about young Gaston we're a pair of fools.'

'I believe every word you have told me, Vaurel; but you'll never get the world to believe it. Lepard simply stated that it was the madman who attacked them with an iron rod, just as he had attacked mademoiselle and myself a few days before.'

'Exactly! It was that put him up to it. Well, monsieur, here is my proof of his lying; and if a man lies in such a case it is for an object. Old Père Goliot had to fetch a parcel from the station for the farm on that day, and

he and Louis Vard walked up together in the rain. Just after they crossed the bridge he—nodding at Roussel on the bed—'broke out from the bushes, crossed the road, and went down towards the river. They were for going after him; but as they heard the train coming up they hurried to the station. You know what time the train from Redon arrives. It was, therefore, exactly three o'clock; and a few minutes later Colonel Lepard says this same Roussel attacked him and the Captain at the old mill of Bessancy, which is four miles away. *Voilà!*'

I nodded. 'That works out all right. But have Louis Vard and old Goliot said nothing of all this to any one else?'

'I went up to Mère Thibaud's last night to wash the taste of that poor devil of a captain out of my mouth. Père Goliot was there, and they were all talking of the murder and chaffing the old man because he said he had seen the madman up near the station that same afternoon, when by rights he must have been down at the old mill murdering people. The old chap went sulky, and would say nothing but "Very well, very well; ask Louis Vard." I knew if Louis Vard saw him it was just the card I wanted, and I had a drink and slipped out quietly to meet him as he came from the station. I asked him if it was true that he and Père Goliot had seen Roussel at three o'clock, and he said it was; and I asked him to keep it to himself till I wanted him to tell it. I told him as shortly as I could why I wished it; and he understood and promised. Then he went in, and I followed him soon after, greeting him as if we had not seen one another a few minutes before. Poor old Goliot was weeping with his head on the table. He had appealed to Louis as soon as he came in, but Louis only laughed at him and said he must have had too much cider; and the old fellow couldn't stand it, and cried like a baby. It couldn't be helped; and when the rest had gone I tackled him while Louis was busy with Jeanne. He stuck to his story, and I wrote it all down in my pocket-book where I mark down my pigeons and my fish, and asked him to sign it, which he did, saying, "And it is all true, Monsieur Vaurel—every word of it." I told him if he took my advice he would say no more about it to any one, or he might get into trouble; and then I gave him five francs, and he went home quite happy. Louis Vard wrote out his statement on the next page. Here it is, and here is Père Goliot's. That little book, monsieur, holds enough to drop Monsieur Lepard's ugly head into the basket. Is it not so?'

'I believe it is, Vaurel, and it was cleverly done on your part. Now, how do you suggest making use of it?'

'Ah! there I don't see my way so clearly. That is what I want to talk to you about. You can guess why Colonel Lepard has gone to Paris?'

'To bury his—friend and explain matters, I suppose.'

'And to secure his papers, without doubt. Now, the first thing is to get Monsieur le Colonel back here without a moment's delay, and the next is to get mademoiselle away before he comes.'

'Why?'

'We may have strange doings when the Colonel comes, monsieur, and mademoiselle will be better out of them. If we once get hold of him we shall not let him go until he tells all he knows.'

There seemed to me possibilities in the scheme, though Lepard did not strike me as a particularly likely subject for coercion. Still, there was no knowing. Men of that mould sometimes go to pieces more readily than quieter and less blustering ones. Anyhow, if the scheme offered the slightest prospect of success it was worth trying.

Vaurel's idea was that mademoiselle might be led to fall in with Madame Mère's proposal, and return with her to Combours to the Convent of the Sacred Heart, of which she was the lady superior. She might do so if it was explained that this was for the sake of Monsieur Gaston; so we sat and planned, and planned again, until it became quite dark.

When at length we had got our ideas into definite shape I returned to the Château and begged Hortense to obtain me an interview with mademoiselle as soon as possible. She returned immediately, and asking me to follow her, led me to the door of mademoiselle's own room.

She met me with an eager questioning in her face.

'You have news for me?' she asked.

'I have very grave news, and a great many plans,' I said. Then I laid the whole matter before her, just as Vaurel and I had discussed it, and told her what we wanted to do. She listened with keen attention, nodding her pretty head now and again to hurry me on, and seeing the end of a sentence before I had barely started it. She was shocked and horrified at the information about Captain Zuyler's murder, but did not question it.

She did not take very kindly to the convent idea, and this somehow gave me pleasure; but she had no better suggestion to offer.

'Madame Mère will be very unwilling to let me go if once she has me at Combours,' she said, shaking her head doubtfully. 'She is made of marble, and has no more heart than a statue. Why can I not stop here?'

I explained that we could not tell what might happen if she did so. According to Vaurel, there would be little difficulty in her getting away when she wanted to go; and on my promising to bring her any news, as she would be sure to be lonely and anxious, she became more reconciled to the idea.

'I hope to be the bearer of good news, for we have the Colonel in a cleft stick, and we won't let him out till he tells us all he knows.'

She nodded. 'How are you going to get him here? You have not told me that yet.'

'I want to send him a telegram in your name, mademoiselle, something like this: "Return immediately," or "Please come quickly—I am in danger."'

She pursed her lips and wrinkled her brow as she thought it over. The idea was evidently distasteful. Then she got a piece of paper and a pencil, and tried the message in various forms; but, judging from her face, she liked the look of none of them. At last, however, she handed me the message in its final shape: 'Come quickly; I want your assistance.'

'Now, when can you be ready to leave here, mademoiselle? The Colonel will be back to-morrow night most likely. Perhaps you will also arrange for Hortense and her mother to go home. We shall want the place to ourselves.'

'Then we must go in the afternoon. I will tell Madame Mère at once and prepare her; and I will arrange about Hortense and her mother. Perhaps you will give some explanation to Monsieur Dieufoy.'

I found Hortense and sent her to ask M. Dieufoy if I could speak with him, and he came down immediately to the *salon*.

'Monsieur l'Abbé,' I said in English, 'I have just come from mademoiselle. I have been urging her to leave this place at once. I do not think it right that she should remain here under present circumstances. Am I not correct?'

He took a pinch of snuff and gazed at me with his head on one side in his inquisitive, bird-like way. He took another pinch of snuff while he arranged his answer in English, and then said, 'I think that is a very wise decision, Monsieur Lamont. What does mademoiselle say?'

'She does not wish to go; but I think I have succeeded in persuading her to it.'

'And where does mademoiselle wish to go?' he asked cautiously.

'Well, I thought perhaps it could be arranged that Madame de St Ouen should take charge of her for a time. Do you think she would be willing to do so?'

'She might,' he said, and took another very deliberate pinch, marvelling much, I could see, at the way Providence was playing into his hands. 'I will speak to madame on the subject. When would mademoiselle think of going?'

'The sooner the better, Monsieur l'Abbé. Candidly,' I said, dropping into a confidential tone, 'I do not consider it safe here with that madman wandering about. There is no knowing what might happen next.'

He nodded. 'I quite agree with you, monsieur. It gives one a feeling of discomfort when he may jump out on you from every bush and any corner. Mademoiselle will be better away; and, *ma foi!* for myself I shall not be sorry to go also.'

What M. Dieufoy thought my real motives were

I cannot say. His face was ever a closed book, though not so tightly sealed as madame's; but I do not think he believed them to be so transparently simple as they seemed. More than once during dinner I felt his eyes fixed inquiringly upon me, as though he would like to look inside and get at actual facts.

As soon as dinner was over I excused myself and slipped off quietly to Vaurel's house, where he was expecting me. A few minutes later he was on his way to the station, where he caught the last train to Rennes, his mission being to send mademoiselle's telegram to the Colonel from the office there. I remained with Boulot in charge of Roussel.

That was a weary vigil, for Master Boulot jumped heavily on to his master's bed the moment Vaurel's back was turned, and curled himself round and went to sleep, leaving me to watch by the sick man or to follow his example as I chose.

However, the night passed between dozing and waking, ministering as well as I was able to the necessities of Roussel, and marvelling somewhat at the strange broad streak in Vaurel's nature which had led him to assume the burden of this flickering life.

Vaurel returned by the early morning train. We discussed some further details of our plans; and then I went back to the Château, where preparations for departure were being hurriedly completed.

When we met at breakfast, which partook somewhat of the nature of a pilgrims' feast—for we were all in our travelling apparel, and had not much time to spare—M. Dieufoy asked me pointedly as to my own plans. I told him that I travelled with them as far as Rennes, where I might stay for a short time, and after that I had made no arrangements.

Our journey to Rennes gave me no opportunity for further conversation with mademoiselle, who sat looking out of the window much as I had seen her that first day we met. There we parted, for M. Dieufoy was to accompany the ladies to Combours.

There was—or so it seemed to me—a look of wistful regret in mademoiselle's eyes as she raised them to mine in saying good-bye; and she said, 'You will not forget to let me know?'

'I shall forget nothing, mademoiselle,' I said, and—well, perhaps my eyes said more than my words, for once more it seemed to me that something in her glance responded to the feeling that was in me.

Madame de St Ouen bade me farewell with a bow of impassive frigidity; but though her face was, as it always was, like that of a marble statue, it conveyed to me, in some occult fashion, a sense of exultation on her part; and I looked at her again to see where it showed, but could not discover it, though the feeling remained with me.

M. Dieufoy, on the other hand, shook me

heartily by the hand, saying how much he had enjoyed my society, and that he hoped we might meet again.

I was permitted, by virtue of the presence of madame and M. l'Abbé, to see the travellers into the St Malo train, and then I took the next train back to Cour-des-Comptes, wondering much what that night and the next few days might have in store for us all.

I took the roundabout path to Vaurel's cottage, and so avoided the village. It was almost dusk when I arrived there, and he was expecting me. The keys of the Château had been left with him by Hortense, acting on mademoiselle's instructions ;

and he proposed that we should go there at once, taking Roussel with us. I had been so busy thinking of other matters that I had overlooked the fact that the sick man would still need our attention ; but there was evidently nothing else to be done with him, and Vaurel had already rigged up a transport hammock by means of a blanket and a long pole.

We carefully put out the fire, which, Vaurel casually remarked, had been alive for over a year ; then, settling Roussel into the hammock, we put the ends of the pole on our shoulders, locked the door, and with Boulot paddling along in front, started out through the shadows for the Château.

## MEXICO TO-DAY.



HERE are not many foreign countries which present so many attractions to the traveller—whether his predilection inclines him to the study of archaeology, botany, geology, birds, beasts, and fishes, or he is merely an admirer of scenery—as old Mexico. The romance of its past history is not so well known as it ought to be ; and from the dim, misty past—when the mysterious race known as the Toltecs constructed their temples, offered their human sacrifices, and carried out their strange rites of sun and snake worship—down to the present day, there has always been a thread of romantic and fascinating unreality entwined in the history of Mexico.

Of the extinction of the Toltecs and the cliff-dwellers by their successors, the Aztecs, but little is known. Whatever the origin of the conquerors, it is certain that they adopted, or continued, most of the forms and ceremonies of the vanquished people in the main national features of government and religion.

One of the saddest pages of history is the conquest of Mexico in 1540 by Cortes, who was sent out by Spain in search of gold. For this reason, and for this alone, was an intelligent, peaceful, and industrious nation sacrificed by that cruel, unprincipled, and relentless robber and murderer. All who read Prescott's history of the conquest of Mexico will shudder at the recital of the wholesale cruelty and murder practised upon the helpless and unsuspecting Aztecs.

From that time until 1820 the fate of Mexico and its inhabitants was the same as Spain has dealt out to all her colonies : they were oppressed, robbed, murdered, and trodden under foot by a long succession of infamous and heartless rulers, whose only creed was their own enrichment, who feared neither God nor man, and whose systematic course of torture and death seems to have been as necessary to them as their daily food. In 1820, however, Mexico aroused herself and threw

off the Spanish yoke. Since then she has made but slow progress, for the majority of her rulers have unfortunately been men who possessed neither education nor those high and noble principles of honour and integrity which alone lead a nation into a progressive, enlightened, and civilised condition.

Happily, Mexico has at present an energetic, liberal-minded, and progressive president—Porfirio Diaz—who was only recently re-elected for another term. The president had occupied the same high office for eight years ; and perhaps it is not too much to say that the republic has made more real, substantial progress under his wise rule than had been made during any other period since 1820. While, on the one hand, he carefully keeps the religious element from interfering with and controlling the civil government, Diaz has also done much towards the repression of crime, the advancement of education, and the development of the commerce of the country. For example, in the promotion of such enterprises as coffee-plantations, sugar and tobacco factories, cotton and flour mills, railway extension, construction of hotels, street-railways, &c., the president offers every facility for the importation of materials and machinery, and encourages speculators and capitalists backed with the requisite credentials.

Of the antiquities of Mexico we need say but little. They are numerous and interesting ; and in the National Museum in the city of Mexico are preserved many objects of great interest, including the calendar-stone, the great sacrificial stone from the war-temple of the Aztecs (on which a young warrior was sacrificed every year with great ceremony by the priests to appease the anger of the ferocious and menacing deity), old armour, pottery, jewellery, feather-work, and many other antiques of absorbing interest to the archaeologist and the antiquary.

The city of Mexico itself is beautiful. It is situated in a valley surrounded by high mountains, some of which are crowned with eternal snow ;

and its broad open plaza, adorned by fine trees and lovely flowers, is the fashionable resort in the evenings, when the military band plays, and the *élite* indulge in a promenade around the plaza, enjoying the soft, balmy air peculiar to that climate. The floating gardens on the lake are very attractive. These were originally large masses of fresh-water plants, which become dense and matted, when the natives deposit baskets of soil on them, and thereby construct a garden. Not being fixed in any way, they really become floating gardens.

Among many objects of interest to visitors are the Cathedral, the president's official residence, and the famous and almost precipitous Castle of Chapultepec. Near by are the remains of the old tree, now carefully guarded by iron railings, where Cortes passed his night of sorrow (*la noche triste*), and the causeway across the lake on which he and his armoured followers fought their way through the hosts of Aztecs into the capital.

There are in Mexico only two classes of people—namely, the highest and the lowest, or the richest and the poorest; there is no middle class. The *élite* or highest class comprises the government officials and army officers, the Roman Catholic clergy, and the rich coffee-planters, *rancheros*, &c. The other class comprises all the working population—such as shepherds, cowboys, artisans, fishermen, and labourers—the *peons*.

Nearly all the stores or shops are in the hands of Germans (many of whom are Jews) and a few Frenchmen; the hotelkeepers are mostly Germans; but the restaurants are kept by Mexicans, who conduct the business according to their national customs—namely, a cup of coffee and a small cake or cigarette for breakfast; lunch or dinner, with meat, fish, &c., at midday; and the chief meal, which you may call either dinner or supper, about seven o'clock. Foreigners, however, prefer European manners and customs; and, therefore, the hotels supply a regular *table d'hôte* breakfast, dinner, and supper.

Although Mexico is only separated from the United States by an imaginary line—for the little Rio Grande cannot really be called a natural barrier between the two republican states—the

high tariffs enforced by both countries prevent a large amount of trade which might be carried on between them; therefore it would be greatly to the advantage of both republics if these duties were considerably reduced or entirely abolished. Uncle Sam demands a high tariff on tobacco, &c., imported from Mexico, and the 'land of God and Liberty' retaliates in like manner. The American ranch-owners want vast herds of young cattle, as well as horses and mules, to stock their ranches; but there is a high and almost prohibitive duty on these animals, which ought to come in free of duty. In fact, the duties on American goods are so high that fancy and leather goods, stationery, decorative articles, chemicals, photographic material, and many other articles can be, and are, more profitably imported direct from France than from Mexico's next-door neighbour, the United States, although there is a difference of several thousands of miles in the distance.

It is somewhat curious that European travellers are not attracted in greater numbers than at present to the republic of Mexico. To the ordinary traveller in search of health or amusement it offers splendid and varied scenery, and a delightful, pure, and health-giving climate. To the capitalist it offers abundant opportunities for his energy and money in many remunerative enterprises; while the climate and the cheapness of food will enable him to keep his expenses down to a nominal sum. To the photographer—amateur or professional—it offers unlimited scope in its varied and magnificent scenery, its mountains, valleys, rivers, forests, volcanoes, its unique villages and dwellings, and the costumes and peculiarities of its natives—all these would supply picturesque objects for his camera in immense variety, and, because of their oddity and rarity, not only captivating but probably also profitable pecuniarily.

Mexico has long had a cloudy and inauspicious reputation for a disregard of life and property; but under the present regime the country is progressing favourably on the onward march of enlightenment and civilisation; and ere long the tourist and traveller will be as safe there as among the peaceful villages of Old England.

## THE BISHOP AND THE CONSTABLE.

IN FOUR CHAPTERS.—CHAPTER III.



OR some moments after the Bishop's departure the girls remained speechless with consternation at what seemed to them the incredible folly of which Arthur had been guilty.

'Well,' exclaimed Katie at last,

'you have done it this time!'

'Oh Arthur! how could you be so—so stupid?' exclaimed Helen tearfully.

'It's Frank's clothes you've got on, of course? I thought so. I knew it was one of Frank's silly tricks,' cried Katie. 'What has he been doing now?'

Arthur hurriedly explained what had taken place.

'Well, upon my word,' said Katie, 'you might be a couple of schoolboys.'

'I don't know what uncle will think of you,'

said Helen despairingly, 'when he gets to know the truth. It would have been much better if you had told him at once who you were.'

But with this view of the case Katie emphatically disagreed.

'No; he couldn't possibly have done that, Helen,' she said decidedly. 'You know the Bishop's opinion about clergymen wearing laymen's clothes.'

'Yes,' said Arthur; 'you see, if I'd told him who I was'—

'You'd have had to tell him who Frank was,' interposed Katie.

'Exactly so; and then Frank'—

'And then Frank wouldn't have got the living offered to him. You see that, Helen?'

'I see that, in order to save Frank, Arthur has made himself very ridiculous,' answered Helen with some asperity, 'and given uncle quite a wrong impression of his character; and that's what you don't appear to see, Katie.'

'But look at the awkward position it would have put Frank in,' expostulated Katie.

'Look at the awkward position it has put Arthur in,' retorted Helen. 'I don't see why Arthur should sacrifice himself for Mr Ambrose, and I think he ought to go to uncle at once and explain everything.'

'Very well, I will,' said Arthur. 'It was Ambrose that got me into the scrape, and he must just look after himself.'

But as he was moving to the door Katie hurriedly interposed.

'Oh, no, no!' she exclaimed, 'you must not, you shall not go. Helen, how can you be so selfish? You know very well that the Bishop at this very moment is writing a letter to Frank offering him the living of Little Southam. If he knows what has taken place he may tear it up, and Frank mayn't get another chance for years until I'm—I'm quite an old maid. I didn't think you could be so unfeeling—so—so selfish, Helen.'

She broke down, and sank into a chair with her handkerchief before her eyes. Helen instantly melted.

'Oh, Katie dear, don't cry,' she said, caressing her. 'Arthur shan't go.—You mustn't go, Arthur.'

'Well, just decide what I am to do,' said Arthur a little testily. 'First you tell me to go, and then you tell me not to go.'

'Oh, you mustn't think of going!' exclaimed Katie.—'Helen, tell him not to go.'

'Of course he mustn't go,' said Helen decidedly. —'I'm surprised at you, Arthur. How can you be so unfeeling?'

'And you must promise not to speak a word to the Bishop,' continued Katie—'not to tell him who you are, or anything about Frank until he has posted the letter.—Helen, make him promise.'

'Promise at once, Arthur.'

'Oh, very well, I'll promise,' rejoined Arthur impatiently; 'though I think it's rather hard lines that I should have to take all the blame on my shoulders when it wasn't my fault at all. However, I'll go and look for the fellow and let him have his togs back.'

But as he was on the point of stepping through the window he was confronted by the stalwart form of Jewson the constable.

'Hullo!' he exclaimed. 'What do you want?'

'Ah!' muttered Jewson, stolidly inspecting him; 'middle height, dark moustache, gold spectacles.'

'What does all this mean?' asked Arthur irritably.

'It means that unless you can give a satisfactory account of yourself I must take you into custody on a charge of obtaining money under false pretences.'

'Take me into custody!' exclaimed Arthur, in amazement. 'Why, you ridiculous ass'—

'Now, don't you get excited, sir,' said Jewson calmly. 'You just give me your name and address, and sufficient proof as you are a clergyman, and I'll thank you kindly, sir, and beg pardon for troubling you.'

Now, as Jewson took out his pocket-book to write down the name and address, the Bishop appeared in the doorway with the letter he had just been writing—the letter offering Ambrose the living of Little Southam—in his hand. Through the corner of his eye Arthur perceived that Katie and Helen in the background were ordering him by peremptory gestures to remain silent.

'I decline to give my name and address,' he exclaimed desperately.

'Ah!' exclaimed the Bishop meaningly.

'Are you a clergyman at all?' asked Jewson.

'This person has already confessed to me that he is not a clergyman,' said the Bishop.

'Oh, that's it—is it?' said Jewson, with a sudden change of manner. 'Now, just you come along with me, and let's have no more of your humbuggin'. Come, stir your sticks.'

'On what charge is he arrested?' asked the Bishop.

'On a charge of obtainin' money under false pretences, sir,' replied Jewson deferentially. In spite of his newly-aroused suspicions against any one in clerical garb, he was deeply impressed by his lordship's gaiters, authoritative manner, and majestic appearance.

'Ah! I should have judged so from his appearance,' replied the Bishop. 'He is probably the person described in this letter to the local paper.' He waved his hand towards the scrap of newspaper which still lay on the table.

'That's him, sir,' said Jewson. 'He's well known to the police—he is. Come along.'

'Oh, look here,' said Arthur desperately, 'you know this is past a joke. I tell you I am'—

But the words died on his lips, for at that moment he caught sight of Katie gazing implor-

ingly at him, and pointing at the letter in the Bishop's hand, and of Helen vigorously shaking her head.

'Oh, come on!' he exclaimed despairingly; 'come on!'

Jewson promptly clutched him by the arm and walked him out of the window, the Bishop watching the proceedings with manifest approval.

'I hope the fellow will be severely dealt with,' he said. 'The mere wearing of clergyman's clothes by a layman should be rendered an illegal offence—don't you think so, Helen?'

'Ye—es, uncle,' replied Helen faintly.

'And it should be equally illegal, as it is equally discreditable, for a clergyman to appear in the clothes of the laity. Are you not of my opinion, Miss Leslie?'

'Certainly, your lordship,' stammered Katie.

The Bishop held up the letter with a fatherly smile.

'I think I gave you a hint as to the destination of this note, Miss Leslie?' he remarked.

'It was extremely kind of you,' said Katie.

'Not at all, not at all. Have either of you a stamp? I have unfortunately left my pocket-book at home.'

'I haven't, uncle,' answered Helen.

'Neither have I,' said Katie eagerly; 'but if you will allow me I shall be very pleased to take the letter to the post-office we passed on our way here. I could get the stamp and post the letter at the same time.'

'Oh, dear me, no,' said the Bishop; 'I couldn't think of troubling you.'

'Oh, really, it would be no trouble,' said Katie, eagerly extending her hand. 'Please let me go.'

'No, no; I couldn't think of it. Pray resume your seat. I shall obtain a stamp from the people of the house.'

Katie collapsed despairingly into a seat as the Bishop went out.

'I don't believe that letter will ever be posted,' she groaned; 'and to think it might be on its way to the post-office if I'd only had a stamp.'

The words were hardly out of her mouth when she leapt to her feet with a cry of alarm, for, peering in at the window in his blazer, boating-cap, and scarlet tie, stood the Reverend Frank Ambrose.

'Frank!' she exclaimed.

'Where's the Bishop?' he asked anxiously.

'He may be back here at any moment. He's gone to post a letter offering you the living; but if he should see you in these clothes'—

'Yes, yes,' interposed Ambrose, 'that's just what's worrying me. I want my own clothes back. Wherever has Arthur got to?'

'He's at the police station, Mr Ambrose,' said Helen severely.

'What in the world is he doing there?'

'He's in custody.'

'In custody!' exclaimed Ambrose.

'Yes,' explained Katie hurriedly. 'You see, a swindler has been going about in clergyman's clothes, and the constable thought it was Arthur, and—and the Bishop was here, and he couldn't explain, and so the constable took him up.'

'Poor old Arthur,' chuckled Ambrose; 'what a state he'll be in! But, I say, it's awfully awkward, you know. How am I to get my clothes?'

'And how is he to get his clothes?' asked Helen, who was beginning to think that Arthur's self-sacrifice had been carried quite far enough.

'Exactly so,' rejoined Ambrose. 'We have got into a nice mess. I don't see how we're to get out of it either.'

'I think the only possible way of getting out of it, Mr Ambrose,' said Helen coldly, 'is for you to go and explain everything to the Bishop.'

'How can you suggest such a thing, Helen?' cried Katie impatiently. 'How can he go and see the Bishop in a blazer? Hush, hush! he's coming.—Frank, go in there. Quick, quick!'

Ambrose darted into an adjoining room, and closed the door just as the Bishop came in.

'The people of the house,' said his lordship, 'to use their own expressive idiom, "haven't a stamp to bless themselves with." I shall, therefore, post the letter when we return to Southpool this evening. I must see about hiring a conveyance.'

'There now,' said Helen tearfully as he quitted the room; 'if Arthur waits till that letter's posted he'll have to be shut up all night. Oh, it's dreadful! What are we to do?'

At that moment the door opened and Mary appeared, Jewson glancing over her shoulder.

'If you please, miss,' said Mary, 'did a young man in a boating-jacket, with a scarlet tie, come in at the window just now?'

'Yes,' answered Katie.

'Did he go out again, miss?'

'No,' rejoined Katie impatiently. 'He went into that room.'

'Oh, he did—did he?' exclaimed Jewson. 'Then I'll soon get him out of it again.'

He darted into the room, and came out again, dragging Ambrose along with him.

'You preposterous idiot,' cried Ambrose, 'what's the meaning of this?'

'Don't you be alarmed, young ladies,' said Jewson. 'It's only another of the same gang. This young woman seen him changing clothes with the other fellow to throw the police off the scent. Come along with you, now. It'll be best for you.'

'I shall not; most certainly not,' exclaimed Ambrose. 'Leave me alone. Let me go, I tell you. Do you hear me? Let me go.'

At that moment the Bishop's voice was distinctly audible outside.

'Thank you, thank you; it's of no consequence—not the slightest consequence. I'll post the letter on my return.'

Ambrose was panic-stricken.

'Take me away at once by the window,' he

whispered hurriedly. 'Quick, you ass! Here's a sovereign. Quick, I tell you; quick!'

He almost dragged Jewson, who was still clutching his collar, out of the window as the Bishop came in.

'Ah!' exclaimed the Bishop, catching a glimpse of the retreating figures. 'The police here again? Who is it this time?'

'It's only another of the same gang,' said Katie feebly.

'Ah! seems to be an active, intelligent officer that,' said the Bishop, moving to the window, while the girls watched him with horror-stricken countenances.

'Stop him, Helen,' whispered Katie in an agony of apprehension.

'Uncle!' exclaimed Helen.

'Yes, my dear,' said the Bishop, wheeling round.

'Would you kindly ring the bell? It's just beside you. I do so want some tea, and these people are so slow.'

'Certainly, my dear,' he replied good-humouredly; and, ringing the bell, again stepped towards the window.

'Oh Helen!' groaned Katie.

'Uncle!'

'Yes, yes, my dear, one moment. Ah! they are out of sight. Now, it's a singular thing; but the back-view of the person that officer had in custody appeared strangely familiar to me. Now, who was it? Who could it be?'

Just at that moment Mary entered the room with a letter in her hand, which she placed on the mantelpiece.

'Did you ring, sir?' she asked.

'Yes, my good girl. These young ladies would like some tea at once, if you please.'

'Yes, sir. It'll be ready in a minute, sir.'

As she went out the Bishop, who was standing near the mantelpiece, glanced absent-mindedly at the address on the envelope.

'Eh—what's this?' he exclaimed—"The Rev. Frank Ambrose, The Red Lion Inn, Higgleston." Why, Ambrose must be staying here. I needn't post the letter at all.'

Katie and Helen looked at each other with an expression of almost tragic despair as the Bishop stood gazing out of the window in a reflective attitude.

'Now, dear me,' said he musingly, 'why should I, in some curious way, connect Ambrose with the back-view of the person who— Ah!—hum—I—I think I shall make a few inquiries.'

As he moved to the door he shot a peculiar look at Katie, who was trying to hide her face behind a book.

'It'll all come out,' moaned Katie when he had disappeared. 'I know it will. He'll get to know everything. Oh, if I could only have got hold of that letter! I knew it would never be posted.'

As she spoke she hid her face in the sofa-cushion and sobbed audibly.

'Don't cry like that, Katie dear,' expostulated Helen. 'Suppose the Bishop should come in.'

'I—I should like to box the Bishop's ears,' sobbed Katie.

'Katie!'

'I should. He'll go and—and pry into everything; and I don't believe he'll post that letter after all.'

'Oh! do hush,' pleaded Helen. 'Some one's coming.'

It was Mary, who announced that the tea was ready in another room.

'Well,' said Mary to herself when they had gone out, 'Joe seems to have done it at last; and if anything comes of it I suppose I shall be Mrs Jewson after all. Well, I suppose I might have done worse. Why, there he is.'

Jewson had once more appeared at the window.

'What! back again, Joe?' she exclaimed. 'Are you after more of them? You've done it this time, Joe.'

'Ay, I have done it, Mary,' replied Jewson lugubriously. 'I've put my big foot in it again—that's what I've done. I got hold of the wrong parties. Them two gentlemen's explained everything, and I've had to let 'em go. I've made a bloomin' hass of myself—that's what I've done. I've just got a telegram from Southpool sayin' as the party wanted is understood to be personatin' the Bishop of Hamchester.'

'The Bishop of Hamchester!' exclaimed Mary. 'Why, that's the name as the party in the queer hat and the knee-breeches gave to the missis.'

'Where is he?' exclaimed Jewson excitedly. 'Where is he? Let me get my hands on him. I'll do it this time, Mary—you see if I don't.'

## THE EDIBLE FROG IN ENGLAND.



ALTHOUGH the edible frog had long been known to have a wide range in the northern hemisphere, it was not until 1843 that it was recorded as a British species. It was then discovered in Foulmire Fen, Cambridgeshire, by Mr Charles Thurnall, of Daxford, whose capture of the reptile is announced in

a letter written by Mr J. P. Wollaston, preserved in the Cambridge Museum. A short notice of the finding of the frogs also appeared in the *Zoologist*, where Mr F. Bond stated that he believed them to be very rare; but he afterwards found they were fairly abundant in the neighbourhood of Foulmire, where their curious croaking, 'a loud snore, exactly like that of the barn-owl,'

had gained for them the names of 'Cambridgeshire Nightingales' and 'Whaddon Organs.'

As soon as they were known to be numerous in the district several people came forward with assertions that they had long been aware there was a species of frog peculiar to the locality; but these statements were of little value. Professor Bell, the author of *British Reptiles*, however, sent to the *Zoologist* a letter which deserved more attention. In it he said: 'I have often heard my father, who was a native of these parts, say that the croak of the frogs there was so different from that of others that he thought they must be of a different kind.' Mr Bond expressed surprise that the frogs had never before been observed at Foulmire, for when he visited the place 'the whole fen was quite in a charm with their song.'

Dr J. E. Taylor, the late curator of the Ipswich Museum, believed that the edible frog was indigenous, but rare in Cambridgeshire. The fact that the creature was practically confined to Foulmire, so far as the county is concerned, seems, however, to indicate that it must at some time have been introduced into the district. On this point the late Canon Kingsley may be quoted. Writing in *Prose Idyls* on 'The Fens,' he brings forward as evidence in support of the theory that the Eastern Fens were once connected by land with the Continent the presence of the edible frog at Foulmire. 'It is a moot point still with some,' he says, 'whether he was not put there by man. It is a still stronger argument against his being indigenous that he is never mentioned as an article of food by the mediæval monks, who would have known—Frenchmen, Italians, Germans, as many of them were—that he is as dainty as ever was a spring chicken. But if he be indigenous, his presence proves at once that he could either hop across the Straits of Dover or swim across the German Ocean.' In the opinion of most authorities, the idea that the edible frog is indigenous to this country may be abandoned, for if the conditions existing at Foulmire were favourable to its preservation, there is no reason why it should not have bred undisturbed for centuries in other fenny districts which were undrained until a comparatively recent date. If it had existed in England from the time when this country was connected with the Continent, specimens ought to have been forthcoming from the south-eastern counties. How it came to Foulmire has never been satisfactorily explained; but there is little doubt that it was imported, as it was into an adjoining county.

Although the discovery of edible frogs at Foulmire aroused considerable interest for a time among naturalists, the subject was eventually dropped for several years. Then it was revived by Professor Alfred Newton, who, while driving through a marshy district in Norfolk, heard a strange noise which puzzled him until it proved

to be the croaking of a considerable number of edible frogs. Through the courtesy of Mr S. H. Miller, of Lowestoft, I am permitted to quote from a letter he received from Professor Newton, who writes: 'As to the edible frog in Norfolk—it was in 1853 that my brother and I found a colony at Rockland. . . . Last May (1876) I found another at Stow Bedon, not very far off; and in the meanwhile it had not been observed by any naturalist, so far as I know. But Lord Walsingham, who was with me on the second occasion, has since ascertained that it is pretty well established in the neighbourhood of Didlington.' As soon as Professor Newton first found the frogs at Rockland, he made inquiries as to their origin, and learnt from Mr J. H. Gurney of Keswick Hall that Mr George Berney of Morton Hall had imported a quantity of them from France in 1837. Two years later the same gentleman imported two hundred more; and in 1841 and 1842 over one thousand were brought by him into Norfolk, and deposited in the ditches and fields at Morton, in some ponds at Hockering, and in the fens at Foulden, near Stoke Ferry. As Foulden is quite close to Didlington, there is little doubt that the frogs recorded by Lord Walsingham as being fairly plentiful at the latter place were the descendants of those liberated at Foulden. According to Mr Gurney, those that were placed in the meadows soon left them for the nearest ponds, where they gradually disappeared, and Mr Berney came to the conclusion that the English climate was not suited to them. Lord Walsingham's discovery, however, tends to prove that they were a long time in becoming entirely extinct; and Professor Newton was satisfied that the species had 'made good its existence in Norfolk for at least thirty-four years.'

When naturalists heard of Mr Berney's experiment, interest was reawakened in the discovery at Foulmire; and as Mr Berney's frogs were liberated in Norfolk six years before the latter event, there were not wanting theorists who suggested that some of the Norfolk frogs had found their way to Foulmire. 'Is it possible,' asked Mr Miller in *The Fenland*, 'that some of these [the Norfolk frogs] travelled from Foulden to Foulmire, a distance of about forty miles?' He agreed that, while possible, this was not a probable explanation of their presence at Foulmire, as 'there is no record of their having been taken between those places.'

In 1874 Mr Miller wrote to *Nature*, asking for information respecting the naturalisation of the species. This was supplied by Lord Arthur Russell, who said that he had, some twelve years before, brought some edible frogs from Paris and placed them in a pond at Woburn Abbey. He added: 'They thrived and multiplied there; but our summers are seldom hot enough to enable the tadpole to attain his full development before the cold

autumnal nights set in. . . . I believe that in our climate the young will pass the winter as tadpoles, and complete their transformation in the following spring. But this would require more accurate information before I can affirm it with certainty.' The experience of Mr Doubleday, of Epping, who liberated some of the Cambridgeshire frogs in a pond near his home, was that 'they soon migrated to another pond, and there made themselves perfectly at home.' He does not say how long they were to be found there.

For further information concerning edible frogs in England we must turn to the *Transactions of the Norfolk and Norwich Naturalists' Society* (vol. iii.). As has already been stated, Mr Bond was the first to record their occurrence in Cambridgeshire. In his letter to the *Zoologist* he said that all the specimens he had examined had, when croaking, 'two large bladders, one on each side of the mouth, which gave it a very curious appearance.' These vocal sacs are characteristic of the male edible frog; and until the publication of the third volume of the *Transactions* no one had doubted that the frogs found in Norfolk and at Foulmire were of other than the edible species. Mr Thomas Southwell, however, who has for a long time been one of the most active and observant members of the Norfolk Society, reported 'that Mr G. A. Boulenger has examined specimens of the Cambridgeshire

and recent Norfolk specimens. To his surprise, he finds they all belong to a very distinct race peculiar to Italy, and not the typical form of Central Europe.' Mr Boulenger himself says: 'It is clear to me, therefore, that all the specimens, the capture of which has hitherto been recorded, whether from Cambridgeshire or Norfolk, are not the descendants of those imported by Mr Berney, but are of Italian origin. By whom, and when, they were introduced into this country I cannot venture to suggest.' Mr Southwell thinks it possible they may have been introduced from Italy by Roman monks, or that Mr Berney may have accidentally imported Italian frogs which had found their way into the north of France.

I have recently made inquiries in the localities where Mr Berney liberated his frogs and Professor Newton discovered colonies of them, and from what I can gather the species is quite extinct there. Mr Gurney has heard of no edible frogs being found in Norfolk for some years. Professor Newton, writing in 1876, said that not a single example of the species had been seen or heard at Foulmire for some twenty-six or twenty-seven years, though the place had often been visited by Cambridge naturalists. Therefore, unless fresh importations have been made in recent years, it is probable that the edible frog does not now exist in a wild state in England.

## A NOVEL EXECUTION.



SOME years ago I was making a tour on foot through the south of Germany, and had spent a week in the pleasant old town of Stuttgart, passing the time in idle enjoyment. I then started off in an easterly direction, as I wanted to explore the mountainous regions which abound in that part of the country, and which are remarkable for the rugged scenery so dear to the eye of an artist. My luggage was simple, consisting merely of a knapsack which contained a few necessary articles of clothing, some tobacco, a little money, and my painting materials; for I intended to rely for what simple food I required entirely on the hospitality of the numerous woodcutters and charcoal-burners who are scattered over the mountains. This plan I carried out successfully enough, and slowly I made my way through the mountains, taking my own time, and always finding, as I expected, food and shelter for the night from the kindly peasants. They seemed always glad of my company to while away the evening, and seldom objected to share my tobacco. Early in the morning, while the mists were yet over everything, I would bid my host farewell and wander on as before, sketching and smoking till night again compelled me to seek shelter.

After some time spent in this way, I came to the ring of mountains which stand up like a mighty rampart round the western side of Bohemia. There my travels ended, for I intended to make my way back to England as quickly as possible, owing to engagements at home.

It was while traversing these mountains that the incident which I am about to relate took place.

On my second day in these regions I had been sketching all day as usual; a gorgeous sunset seen from a lofty peak had stayed my progress for some time, while I endeavoured to transfer the lovely tints of the little clouds that flecked the horizon to my sketch-book. When these had died away I packed up and began to think of trying to procure a shelter for the night, which had quickly come on. I looked round, hoping to see the familiar red glare of the woodman's fire, but I was disappointed, and so walked on, keeping a bright lookout while.

At last I saw a faint twinkling light straight in front of me, and accordingly bent my way in its direction. As I neared the light I made out the form of some large building looming out in the darkness. This I guessed to be one of those small fortresses which are placed in the chief passes for defence against invasion. My surmise was proved

correct by the loud challenge of a sentinel, '*Wer da?*' Giving the customary answer, I advanced to the bastion where the sentinel was standing, and explained to him my dilemma. He called to another man, who ran off and returned immediately with a young officer. The latter greeted me courteously, and said, after some conversation, that if I wished I might spend the night in the fort. This offer I gladly accepted, and being admitted into the fort, was conducted by the young officer to his quarters. Soon a substantial meal was set before me; and during the repast, in which he joined, I told him who and what I was, and explained how I came to be there at such a time. He was not surprised, for he said at that time of the year many tourists found their way even to that lonely spot. 'Yes,' he added, 'we have given many shelter here, and only exact from them a promise that they will make no drawings or plans of the fort; and we, of course, shall ask the same of you.' I gave the required promise, and then showed him my sketches, with which he seemed much pleased, recognising many places, and expatiating the while on the beauty of his beloved country, in which I heartily joined. He then told me he was a lieutenant of artillery, and was in command of the small detachment which formed the garrison of the fort.

'And don't you find it very dull up here all alone?' I asked. 'No,' he answered; 'not so dull as you might think by any means. You see, there is plenty of game to be had, large and small, for the shooting; the scenery is delightful to me, who, like you, am a bit of an artist; and then the banditti usually provide a little additional excitement.' 'What!' said I, 'are there banditti about here, then?' 'Yes,' he answered; 'most certainly, though not in the direction from which you have come. But as you proceed into Bohemia you will find the mountains infested with them, and I shall send an escort down with you to-morrow. Indeed, in these piping times of peace, it is chiefly for the purpose of escorting travellers through the mountains that we are here. You will have a specially strong escort to-morrow, though, as we have here at present, confined in the fort, a notorious bandit we captured but yesterday, in a raid on his hiding-place; and to-morrow I shall send him down to Rabensburg for trial. There is no doubt what his fate will be. Two murders have been proved against him, and there are numerous unproved ones and hundreds of robberies down to his name. It is, as you say, a long way to send him; but Rabensburg is our headquarters, and he will be tried by the military there. But you must be tired and glad to get to bed.' Saying this, he showed me to a small bedroom and left me to my slumbers.

I was awakened early the next morning by the sound of a bugle, and was soon out to enjoy the fresh air and fine scenery. I was immediately struck by the strong position of the fort, the site

on which it was built being admirably adapted for defence. The road, if road it could be called—perhaps pass would be a better word—here ran for a full mile in a kind of glen or gully, lined on either side by lofty and precipitous rocks, which, towering up high on each side, left only a narrow way in the middle. Standing in the centre of this gully you could look along the path about half a mile each way, at which distance it came to a stop, the road suddenly dipping down, on one side to Rabensburg, and on the other towards a forest. It was in the middle of this valley, or rather cutting, that the fort had been built, stretching across the narrow way from one wall to the other, so that, if necessary, the road could be completely blocked and swept by the guns of the fort. In times of peace the fort had a gate left permanently open, allowing travellers to walk right through it and pursue their way to the farther side.

My friend the lieutenant soon joined me, and I remarked on the strong position held by the fort. 'Yes,' said he, smiling, 'I think we could give a good account of ourselves before an enemy could pass along the road from end to end;' and he pointed to the three guns mounted on each side commanding the two roads. A large one was in the middle and a smaller one was on each side of it, and very formidable they looked. He said I might leave them at noon, when the escort for the prisoner would be ready. Hardly had he finished speaking when a shout was heard in the fort, followed by a report of a rifle and a babel of cries. The officer rushed down to see what was the matter, I following him closely. Arrived at the square, we found a crowd of soldiers assembled round a man lying on the ground, bleeding profusely from a wound in the shoulder. The officer was quickly told the cause of the tumult. The bandit, while being led out of his cell, preparatory to being marched away, had suddenly stabbed a soldier with a hidden knife, and, taking advantage of the surprise he had created, had escaped from the fort, though a sentry had fired at him. He was soon descried flying down the road which led to the forest, and several men started in pursuit. The officer was about to follow them, when a grizzled veteran touched his shoulder and said a few words to him. 'Are you quite sure you can do it, gunner?' asked the lieutenant. 'Perfectly certain, sir,' replied the old soldier. 'I will lay my life on it she will not fail us at this moment.' 'Very well, then,' said the lieutenant; 'recall the men.' The bugle rang out, and the pursuers turned and slowly retraced their steps to the fort. 'After all,' he went on, 'it is our best chance, for they could never catch him. Just look at the pace he is going at! I would not lose that scoundrel for anything; and if we cannot take him alive we must anticipate his fate, and take him dead.' Several men had been potting at the fugitive with their rifles, but without

success; so he ordered them to desist, as it was only throwing away ammunition.

Lighting a cigarette, he sat down and calmly watched the ever-lessening form of the brigand. I now went up to him and asked the reason of this strange apathy on the part of the garrison. 'Don't be in a hurry, my friend,' replied he, smiling; 'we are not so lazy and foolish as doubtless you think. Listen to me.' He then explained that, just as he was also starting in pursuit of the fugitive, the old gunner had told him that there was a far quicker and surer method of arresting him than that of pursuit. The big gun in the centre of the rampart on that side had, by constant practice, been trained to throw its projectile exactly in the middle of the narrow path, just before it dipped out of sight, and had been kept permanently in that position. 'And,' the lieutenant went on, 'Gunner Müller is ready to swear that a ball or shell thrown from that gun will hit the exact spot, provided the gun has not shifted. Now, in that case, all we have to do is to wait till our friend there gets on, or near, that spot, and there you are! You see it is impossible for him to turn to the right or left till he gets out of the pass, owing to the precipices on either side.—You know, Müller,' said he, turning to the gunner who was standing by, 'the right kind of shell for this case?' 'Yes, sir,' said the soldier, saluting; 'I know the very thing required, and if the rascal is within ten yards' radius of the bursting-point he won't gain the end of that path.' 'Good,' said the officer; 'load!' The heavy shell was hoisted into the breech and everything was got ready for the shot. This all happened in much less time than it takes to describe it, and now the man was within eighty yards of the fatal spot. After finding that he was not pursued, he had relaxed the speed at which he started from the fort, and was now trotting steadily on towards the desired goal, keeping in the middle of the path, and no doubt congratulating himself on his escape. When within thirty yards of the place he dropped to a leisurely walk, looking round

continually to make sure that no one was after him. Once he stopped, and, turning round, made what seemed a gesture of contempt at the fort, and, having thus relieved his feelings, walked on again.

Slowly he neared the fatal spot. All on the fort were breathless with suspense and doubt, for it seemed quite possible that the gun might somehow have got shifted since the last practice. Only the old gunner was calm and confident, and lovingly eyed his great charge. I was standing with the lieutenant near the gun, and the wall was lined with every man in the fort, all eagerly gazing at that small, dark spot moving so slowly on.

As the bandit neared the end of the path the old gunner handed the lanyard of the gun to a subordinate and bade him fire when he lifted his foot. Then, taking a telescope, he directed his gaze on the fugitive. A deadly silence reigned in the fort. I could hear my heart beating plainly, and I believe every man was in an equal tremor of excitement. I half-hoped that the man, robber and murderer though he was, might escape.

When would the signal be given? The suspense was becoming unendurable. I looked at Müller—he was gazing through the telescope. Suddenly he kicked out his leg, still keeping his eye to the glass. A vivid flash followed, a deafening roar, which shook the fort, and then a cloud of white smoke obscured everything. When it had cleared away, Müller was standing beside my companion, with a look of content on his face. 'I was right, sir,' he cried; 'he was hit fair.'

True enough, nothing was to be seen where the bandit had been. A loud cheer followed the announcement, and the officer shook hands heartily with Müller, and retired to make a report of the matter, while a party were sent to collect the remains of the victim. A few hours later I left the fort with my escort, after a hearty farewell to the commandant. As we passed the fatal spot I shuddered to see unmistakable signs of the accuracy of the shot, and hurried on to leave the ill-omened place behind.

## NATAL WATTLE-BARK.



AN important industry has sprung up in Natal within the last few years in the growing of wattle-trees (*Acacia mollissima*, or *mimosas*), the bark of which is exported to Great Britain and to the Continent for tanning purposes. The trees were originally planted on farms as shelter for houses and crops, and it was some time before their real value was discovered. Formerly the principal supply of bark came from Australia. There, we believe, it is stripped from wild indigenous wattle-trees;

thus the Australian quality cannot be so regular as that from Natal, where all the trees are planted, and are barked when they come to maturity, in from five to seven years.

The usual method of planting the trees is to break up the land and sow a crop of mealies. When the mealies come up a few inches, the wattle-seed is planted in the following way: Straight lines are marked out about six feet apart; native labourers or coolies then walk up these lines and make holes seven feet apart with a hoe, and other men following them drop in a

few seeds, covering these by scraping back the soil with the foot. In three weeks the trees begin to show above ground; then the ground is gone over again, and all the blanks are filled up. Sowing is generally done in December, the seed being gathered from the trees during the previous month. This seed being very hard, it is soaked in hot water before planting.

The mealie crop is gathered in May and June, and the cattle turned on to eat off the stalks do not harm the young trees in dry weather. The second year the trees are thinned out, only leaving one in each space. Being in rows close together, the trees grow up tall and straight, with few branches except near the top; some will attain a height of sixty feet or more according to soil and climate. It is a very pretty, graceful tree, and when in full yellow bloom these plantations of hundreds of acres make a sight to be remembered, although on some days the scent is almost overpowering.

The wattle-trees do best on the high ground and hills round Pietermaritzburg, where they get sufficient moisture, the summer being often rather wet; but the trees thrive best in damp weather, as they need an immense supply of moisture. If planted near a small watercourse they soon dry it up.

Either coolie or Kaffir labour is employed for stripping the trees. The bark is cut close to the ground and beaten with the back of an axe to loosen and split it; then it is removed by hand and torn into strips. As there are few branches, the strips are twelve feet or more in length. The tree is then cut down, the branches and top lopped off, and the trunk thoroughly barked. The pieces of bark are now cut into ten-foot lengths, tied in bundles of about fifty pounds weight each, and taken to the drying-shed; and when dry the strips are again cut up and sent to the mill to be cut into small pieces and packed in sacks for export.

In cutting down a plantation it is usual to go through it and take out all the biggest trees, and the following year all those left are cut down and the stumps and brushwood burnt. As the fallen seeds germinate, in a few years there is a good plantation of self-planted trees. For the timber itself there is only a small demand at present for pit-props and firewood; but inquiries are being made as to the suitability of the wood as pulp for papermaking.

On some of the larger farms the bark is cut, packed, and shipped direct. In winter, there being little or no rain, a large quantity is cut in five-foot lengths and dried outside; but the colour of this is not equal to shed-dried bark. A good plantation will yield about five tons of bark per acre; and its present value before it is cut and packed in sacks is about 5s. per cwt.

The demand seems on the increase, and planting is largely carried on. Lately a shipment of

500 tons was sent on trial to Australia. In 1895 New South Wales imported, chiefly from Tasmania, 80,770 cwt., valued at £19,634—the value of the export from Natal for the same year being £17,200; in 1898 the exports had risen to 188,553 cwt., valued at £30,929: namely, to Great Britain, 173,819 cwt.; Cape Colony, 3380 cwt.; Germany, 6880 cwt.; Holland, 454 cwt.; Delagoa Bay, 4200 cwt. In 1898 the lands in Natal under wattles extended to 21,838 acres.

No doubt when this present war is over and South Africa is under the Southern Cross flag of a United South Africa (or is it to be the Dominion of South Africa?) the colonies will make rapid progress in the arts of peace. Then, we may hope, wattle timber as well as the bark will find a profitable market.

#### LONGING.

The green road, the clean road: it is so broad and high;

It stretches from the happy sea to touch the happy sky. Oh! I laughed once to forsake it, but I'm longing now to take it—

The green road, the clean road, that is so broad and high.

The gray street, the gay street: how solemnly it shines!

The sun imprints his pleasures, but there's pain between the lines.

Oh, I smiled at first to see it, but I'm eager now to flee it—

The gray street, the gay street: how solemnly it shines!

The pure love, the sure love comes over me like rain; The tinsel of my heartless love is turning poor and plain.

It's my life I have been giving just to make a decent living,

It's my all I have been losing just to get a little gain.

The nest song, the best song is crying swift and sweet: The tune's within my bosom, but the time's not in my feet.

Ah! they only sing for pity, do the voices in the city. Did you ever hear a homely song sound happy in the street?

The gray street, the gay street: for me it holds no rest,

Not even when the summer sun is sailing down the west;

And I cannot find my pleasure in a road my sight can measure

From the little room I dwell in with a memory for my guest.

The green road, the clean road: it is so broad and high,

It stretches from the happy sea to touch the happy sky. Oh, to rise and part with sadness! oh, to move and meet with gladness,

On the green road, the clean road, that is so broad and high!

J. J. BELL.